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.. not available for a specific reference period
... not applicable
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0^s value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
^{p} preliminary
^{r} revised
x suppressed to meet the confidentiality requirements of the *Statistics Act*
^{E} use with caution
F too unreliable to be published
* significantly different from reference category ($p < 0.05$)

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Abstract

Background: Approximately one-third of Canadians' prescription medication costs are paid directly out-of-pocket. This study attempts to determine if out-of-pocket expenditures of more than 5% of household income on drugs and pharmaceutical products are associated with cost-related prescription non-adherence among people with cardiovascular-related chronic conditions.

Methods: The data are from the survey on Barriers to Care for People with Chronic Health Conditions. Three categories of out-of-pocket spending on drugs and pharmaceutical products as a percentage of household income were identified: 0%, more than 0% to less than 5%, and 5% or more. Log-binomial regression was used to examine associations between category of out-of-pocket spending and cost-related prescription non-adherence.

Results: In 2012, about 80% of people aged 40 or older who lived in British Columbia, Alberta, Saskatchewan or Manitoba and had cardiovascular-related chronic conditions reported out-of-pocket spending on drugs and pharmaceutical products; 4.8% reported out-of-pocket spending of at least 5% of their household income. These individuals were significantly older, more often lived in households with incomes less than $30,000, and more often reported multiple morbidities than did people whose out-of-pocket spending on drugs and pharmaceutical products was less than 5% of household income. When the results were adjusted for age and sex, people whose spending amounted to 5% or more of household income were almost three times as likely (prevalence ratio rate = 2.6) to report cost-related prescription non-adherence than were those spending less than 5%.

Interpretation: Spending at least 5% of household income on drugs and pharmaceutical products was significantly associated with cost-related prescription non-adherence. Additional data are required to determine if even lower levels of spending put individuals at risk of cost-related non-adherence.

Key words: Chronic disease, cost-related non-adherence, health policy, out-of-pocket expenditures, prescription drugs

Prescription drugs are essential in the management of chronic diseases—an estimated 90% of individuals with major chronic conditions report taking one or more medications.[1,2] Unlike hospital and physician care, prescription medications (other than those provided in hospital) are not covered by a universal insurance plan. Although all Canadian provinces provide some publicly funded drug insurance for certain segments of the population such as seniors and people receiving social assistance, provinces differ in their coverage of prescription medications for other groups and in the provision of catastrophic drug coverage.[3-6] For many Canadians, prescription drugs are financed primarily through private insurance and out-of-pocket expenditures.[7,8] According to the Canadian Institute for Health Information, out-of-pocket spending made up 34.3% of private expenditures on prescription medications in 2010.[7]

In 2011, Canadian households spent an average of $476 out-of-pocket on prescription medications.[9] Average annual expenditures were higher at older ages, exceeding $600 for households with heads older than 55.[10] In 2010, 20% of households spent more than 1% of their after-tax income on prescription medications, and 3% spent more than 5%.[11] The economic burden of out-of-pocket expenditures related to medications and health care in general has grown over time, particularly among the lowest income households.[8,12,13]

Inconsistent public insurance coverage for prescription drugs and high out-of-pocket spending have raised concern that some people may forego medications owing to cost.[14,15] Law et al. observed that about one Canadian in 10 reported cost-related non-adherence to prescriptions.[16] For individuals with chronic diseases, non-adherence can have serious consequences, including increased mortality, use of emergency departments, and need for in-patient services.[17-22] Based on the same source as the present analysis, Campbell et al. found that patients facing financial barriers to care were more likely to visit the emergency department or to be admitted to hospital for their chronic conditions and less likely to use guideline-recommended therapies like statins.[6]

Previous research has identified factors associated with cost-related prescription non-adherence (including out-of-pocket spending[12,23]), but no Canadian study has examined the relationship between the level of out-of-pocket spending and the likelihood of cost-related non-adherence. North American studies on health care expenditures overall (including prescription medications) have used an out-of-pocket threshold of 10% of income to identify high-spending households.[12,24] In Canada, the 2002 Kirby Report recommended that households pay no more than 3% of their after-tax income for prescription medications,[25] although this level was not empirically associated with a higher likelihood of cost-related non-adherence. While a cut-point for

Authors: Deirdre Hennessy (Deirdre.hennessy@canada.ca) and Claudia Sanmartin are with the Health Analysis Division at Statistics Canada. Paul Ronksley is with the Ottawa Hospital Research Institute. Rob Weaver, Dave Campbell, Braden Manns, Marcello Tonelli, and Brenda Hemmelgarn are with the Department of Community Health Sciences, University of Calgary.

high out-of-pocket spending on medications has not been identified, national agencies currently use 5% of household income as a health indicator.[11,26]

This study analyzed results from the survey on Barriers to Care for People with Chronic Health Conditions to determine if spending of 5% or more of household income out-of-pocket on drugs and pharmaceutical products was associated with cost-related non-adherence.

Methods

Data source

The survey on Barriers to Care for People with Chronic Health Conditions (BCPCHC) was designed by the Interdisciplinary Chronic Disease Collaboration (www.ICDC.ca)[27] and administered by Statistics Canada. The sampling frame consisted of respondents aged 40 or older to the 2011 Canadian Community Health Survey (CCHS) who resided in British Columbia, Alberta, Saskatchewan or Manitoba and who reported having heart disease, stroke, diabetes, or hypertension. Based on these criteria, 2,400 respondents were identified for participation in the BCPCHC; 2,316 were still in scope at the time of survey administration (February 1 to March 31, 2012). The response rate was 80%, yielding a final sample of 1,849 individuals. Respondents were asked about care that they received for their chronic condition(s) and potential barriers to care that they experienced. With participant consent, responses to the BCPCHC were linked to their 2011 CCHS data to provide more detailed sociodemographic information, including household income. In accordance with Statistics Canada procedures, the BCPCHC underwent pilot testing to ensure that potential participants understood the questions.

This study was approved by the Conjoint Health Research Ethics Board of the University of Calgary and the Health Research Ethics Board of the University of Alberta.

Cost-related non-adherence

Cost-related non-adherence to prescription medications, the primary outcome in this analysis, was determined from responses to two sets of questions. In the first set, respondents were asked: "In the past 12 months, how often did you not get the necessary services, equipment or drugs you needed due to cost?" Those who answered "always," "often," or "sometimes" were asked: "What type of services, equipment or medication?" Those who specified "prescription medication" were flagged as reporting cost-related non-adherence. In the second set of questions, respondents were asked: "Over the past 12 months, have you ever stopped taking one or more of your drugs as prescribed for a week or more?" Those who answered affirmatively were asked: "What are the reasons that you did not take your medication as prescribed - Cost?" Respondents who answered "yes" to either of these questions were classified as reporting cost-related non-adherence.

Out-of-pocket spending

Out-of-pocket spending as a percentage of household income, which has been used as a health indicator,[10,11,26]

Table 1
Respondent characteristics, by category of out-of-pocket spending for drugs and pharmaceutical products, household population age 40 or older with cardiovascular-related conditions, Manitoba, Saskatchewan, Alberta, and British Columbia, 2012

				Out-of-pocket spending as % of household income								
	Total			0%			More than 0% to less than 5%			5% or more		
		95% confidence interval			95% confidence interval			95% confidence interval			95% confidence interval	
Characteristic	%	from	to	%	from	to	%	from	to	%	from	to
Percentage of population (%)	100	...	...	19.1	15.8	23.0	76	72.2	79.5	4.8	3.7	6.2
Mean out-of pocket expenses for prescription medications and pharmaceutical products ($)	539	472	606	0	...	...	517	474	561	3,021[†]	2,229	3,813
Sex (%)												
Men	49.9	46.0	53.8	52.6	41.2	63.7	46.9	42.2	51.5	58.5	45.6	70.4
Women	50.1	46.2	53.9	47.4	36.3	58.8	53.2	48.5	57.8	41.5	29.6	54.5
Mean age (years)	65.1	64.3	65.9	57.6	55.2	59.9	65.6	64.6	66.6	69.4[†]	66.5	72.2
Age group (%)												
40 to 64	48.9	45.7	52.1	76.6	68.2	83.3	46.6	42.2	51.2	30.2[E†]	20.0	42.9
65 to 74	26.9	23.9	29.9	13.8[E]	8.8	21.0	29.9	26.0	34.2	33.3	23.3	44.9
75 or older	24.3	21.6	27.1	9.6[E]	5.9	15.2[E]	23.4	20.1	27.1	36.5[E]	25.1	49.7
Household income (%)												
Less than $30,000	21.8	18.9	24.8	19.6[E]	13.2	28.1	18.0	14.9	21.6	52.8[†]	40.7	64.5
$30,000 to $54,999	27.4	24.4	30.6	22.2[E]	15.1	31.5	27.7	24.2	31.5	31.4[E]	21.4	43.4
$55,000 to $94,999	24.9	21.6	28.5	14.5[E]	9.2	22.1	29.9	25.5	34.6	F	...	...
$95,000 or more	25.9	22.5	29.8	43.7	32.4	55.7	24.4	20.4	28.9	F	...	...
Number of chronic conditions (%)												
One	67.8	64.8	70.9	73.7	64.7	81.1	68.8	64.7	72.6	47.8[†]	36.0	59.9
Two or more	32.2	29.1	35.2	26.3	18.9	35.3	31.2	27.4	35.3	52.2[†]	40.1	64.0
Mean number of medications	4.1	3.8	4.4	4.0	3.4	4.6	3.9	3.5	4.2	6.9[†]	5.5	8.2
No insurance for medications (%)	14.1	11.4	17.2	F	...	...	14.9	11.4	18.3	25.3[E]	15.1	35.4

... not applicable
[E] use with caution
F too unreliable to be published
[†] significantly different from those spending more than 0% to less than 5%
Source: 2012 Barriers to Care for People with Chronic Health Conditions Survey.

was the primary exposure of interest. Respondents were asked to estimate their out-of-pocket spending on drugs and pharmaceutical products during the past 12 months; those who could not recall the past 12 months were asked about the previous 3 months, and their annual expenses were extrapolated. About 11% of respondents did not reply to this question, and were excluded from the main analysis. Self-reported out-of-pocket spending on drugs and pharmaceutical products was divided by self-reported household income and multiplied by 100 to determine the percentage of total household income allocated to these expenditures. Of the study sample, 70% provided their annual household income; for the remainder, income was imputed using a nearest-neighbor technique including postal code, median income, household size, and approximate household income range.[28]

Other variables

The variables in the analysis included sex, age group (40 to 64, 65 to 74, and 75 or older), and household income (less than $30,000, $30,000 to $54,999, $55,000 to $94,999, and $95,000 or more). Participants were chosen for the BCPCHC based on a positive response to questions about physician-diagnosed heart disease, stroke, diabetes, or hypertension in the 2011 CCHS. For descriptive analysis, respondents were categorized as having one versus two or more of these chronic diseases. Respondents were asked how many medications they took on an ongoing basis, and if insurance covered all or part of their prescription medications costs.

Statistical analyses

Out-of-pocket spending on drugs and pharmaceutical products as a percentage of household income was grouped into three categories: 0%, more than 0% to less than 5%, and at least 5%. A descriptive analysis provided a profile of respondents in each spending category. The 5% cut-off was chosen because national agencies use it as a health indicator.[11,26] A sensitivity analysis, with out-of-pocket spending at 3% of household income as the cut-off, was also completed.

Log-binomial regression models were used to calculate unadjusted and adjusted prevalence rate ratios (PRR) of the association between out-of-pocket spending on drugs and pharmaceutical products and cost-related prescription non-adherence. The purpose was to determine if out-of-pocket spending of more than 5% of household income was associated with cost-related non-adherence to prescribed medication, not to identify factors contributing to cost-related non-adherence, which have previously been described for Canada.[12,23]

For all tests, $p < 0.05$ was considered statistically significant. The analyses were weighted to reflect the population aged 40 or older with cardiovascular-related conditions in the four western provinces using sampling weights provided by Statistics Canada. Bootstrapping techniques with 500 replications were used to calculate standard errors and confidence intervals (CI) around the estimates. To determine the reliability of the reported estimates, the coefficient of variation (CV) was calculated.[29] As per Statistics Canada guidelines, estimates that did not meet minimum cell-size requirements and had CVs greater than 33.3% were not reported (denoted by F). Estimates that met cell-size requirements, but had a CV greater than 33.3%, were reported as being less than the upper limit of the 95% confidence interval. All analyses were conducted using STATA 11.0 (Statacorp, College Station, TX).

Table 2
Log binomial modelling of association between out-of-pocket spending on drugs and pharmaceutical products at 5% and 3% of household income and cost-related prescription non-adherence, household population age 40 or older with cardiovascular-related conditions, Manitoba, Saskatchewan, Alberta, and British Columbia, 2012

	Cost-related prescription non-adherence								
	Prevalence			Prevalence rate ratio					
Out-of-pocket spending on drugs and pharmaceutical products as % of household income	%	95% confidence interval from	to	Unadjusted	95% confidence interval from	to	Age- / Sex-adjusted	95% confidence interval from	to
Overall	4.1[E]	2.6	6.3	...	...	...	...	...	...
0%	0.0	...	...	...	...	...	...	...	...
More than 0% to less than 5%[†]	5.2[E]	3.1	8.5	1.0	...	...	1.0	...	...
5% or more	<21.5[†]			2.2	0.8	5.6	2.6*	1.0	6.4
Sensitivity analysis									
More than 0% to less than 3%[†]	4.9[E]	2.7	8.6	1.0	...	...	1.0	...	...
3% or more	8.2[E]	4.9	13.7	1.7	0.7	4.0	2.0	0.9	4.9

... not applicable
[E] use with caution
* significantly different from reference category ($p < 0.05$)
[†] upper bound of confidence interval that is reportable when number of observations exceeds 10, but coefficient of variation is greater than 33.3%
[‡] reference category
Source: 2012 Barriers to Care for People with Chronic Health Conditions Survey.

Results

Fully 90% of the 1,849 respondents to the survey on BCPCHC answered the questions about out-of-pocket spending on drugs and pharmaceutical products. Of these individuals, 19% reported no out-of-pocket spending; 76% reported spending more than 0% but less than 5% of household income; and 4.8% reported 5% or more (Table 1). The overall mean out-of-pocket expenditure was $539. The mean among those spending less than 5% of household income was $517, but among for those spending 5% or more, the mean was $3,021 (Table 1).

Compared with people who spent less than 5% of household income on drugs and pharmaceutical products, those spending 5% or more were older, and more likely to live in households receiving less than $30,000 annually

(53% versus 18%) and to have at least two cardiovascular-related conditions (52% versus 31%) (Table 1). They also used significantly more medications on average (6.9 versus 3.9). As well, 25% of those spending 5% or more did not have supplemental insurance for prescription medications, compared with 15% of those spending less than 5%; although substantial, this difference was not significant.

Overall, 4.1% (95% CI: 2.6 - 6.3) of individuals reported cost-related prescription non-adherence (Table 2). As expected, people without any out-of-pocket expenses on drugs and pharmaceutical products did not report cost-related non-adherence. However, 5.2% of those with out-of-pocket expenses greater than 0% but less than 5% of household income reported cost-related non-adherence. Because of a large coefficient of variation, it was not possible to report the exact prevalence of cost-related prescription non-adherence among individuals whose out-of-pocket spending amounted 5% or more of their household income; nonetheless, the upper bound of the 95% confidence interval of the estimate was 21.5%.

According to results of the unadjusted log binomial regression model, the prevalence rate ratio (PRR) for cost-related non-adherence among individuals whose out-of-pocket spending on drugs and pharmaceutical products was 5% or more of household income was 2.2 (95% CI: 0.8 - 5.6), which was not significantly different from 1.0. Age- and sex-adjusted results revealed that those spending 5% or more were significantly more likely to report cost-related non-adherence than were those spending less than 5% (PRR = 2.6; 95% CI: 1.0 - 6.4) (Table 2). A sensitivity analysis showed that cost-related prescription non-adherence was not significantly related to out-of-pocket spending at 3% of household income, in either the unadjusted or adjusted models (PRR = 2.0; 95% CI: 0.9 - 4.9 in adjusted model) (Table 2).

Discussion

About 80% of western Canadians aged 40 or older with cardiovascular-related chronic diseases reported out-of-pocket spending on drugs and pharmaceutical products; for almost 5% of them, spending amounted to at least 5% of their household income. These individuals were older, more often lived in households with annual income less than $30,000, and more often reported multiple morbidities, compared with people whose out-of-pocket spending on drugs and pharmaceutical products was less than 5% of their household income. On average, the out-of-pocket amounts reported by the higher-expenditure group were about six times those of respondents whose spending was less than 5% of household income. In addition, after adjustment for age and sex, spending more than 5% of household income out-of-pocket on drugs and pharmaceutical products was significantly associated with a higher likelihood of cost-related prescription non-adherence, compared with those whose spending totalled less than 5%.

The overall prevalence of cost-related prescription non-adherence in this study (4.1%) was lower than the almost 10% found by Law et al.[11] The results were closer to those of Kennedy and Morgan, who, in a cross-national study of cost-related prescription non-adherence in Canada and the United States, reported an overall rate of 5.1%.[23] The study by Law et al. was based on a national survey representing Canadians aged 12 or older; Kennedy and Moore sampled people aged 18 or older. By contrast, the sample in the present study consisted only of people aged 40 or older with specific cardiovascular-related conditions, among whom cost-related prescription non-adherence would be less common because the consequences are potentially life-threatening and because a larger percentage of respondents (due to older

What is already known on this subject?

- Approximately one-third of Canadians' medication costs are paid directly out-of-pocket.
- All Canadian provinces provide some publicly funded drug insurance for certain groups, but prescription medications are not covered by a universal insurance plan.
- Inconsistent public insurance coverage for prescription drugs and high out-of-pocket spending have raised concern that some people may forego medications owing to cost.

What does this study add?

- Based on results from the Barriers to Care for People with Chronic Health Conditions, an estimated 4.8% of western Canadians with cardiovascular-related conditions reported out-of-pocket spending on drugs and pharmaceutical products amounting to 5% or more of their household income.
- These individuals were older, more likely to live in households receiving less than $30,000 annually, to have at least two chronic conditions, and to use more medications on average, compared with those who spent less than 5% of their household income on drugs and pharmaceutical products.
- Those spending at least 5% were significantly more likely to report cost-related prescription non-adherence than were those spending less than 5%.

age) would have provincial drug plan coverage.

The factors associated with cost-related prescription non-adherence in the present analysis are generally consistent with Canadian and international literature. In Quebec, Tamblyn et al. found that 31.3% of first-time prescriptions were not filled within nine months, with the risk of primary non-adherence being greater for higher-cost medications and among patients with higher drug co-payments.[30] Internationally, Helin-Salmivaara et al. showed that cholesterol medications that required smaller out-of-pocket payments promoted adherence to ongoing therapy.[31] In British Columbia, Hanley et al. demonstrated that uptake of recommended therapies after an AMI was less than optimal among individuals of lower socioeconomic status, possibly because of small co-payments for prescription medications in that province.[32] Similarly, Kennedy and Morgan found that cost-related non-adherence was associated with lower income and with lack of prescription medication insurance, which indirectly reflects out-of-pocket costs.[23] In a review of patient-borne costs, prescription non-adherence, and health outcomes,[33] Eaddy et al. concluded that patient cost-sharing was associated with decreasing adherence across a range of therapies, which, in turn, was associated with poorer health outcomes.

While the association between out-of-pocket spending and cost-related prescription non-adherence is well established, this study adds empirical information about an upper threshold of spending linked to cost-related non-adherence. In the present analysis, individuals whose out-of-pocket spending on drugs and pharmaceutical products was at least 5% of their household income were more likely to report cost-related non-adherence. While this suggests that some level of out-of-pocket spending can be tolerated before costs negatively affect adherence, the threshold may actually be lower. Evidence from Canada and the United States indicates that for certain populations, even small co-payments increase the risk of prescription non-adherence.[30,34,35] A larger dataset would be required to determine the exact level of out-of-pocket spending at which cost-related non-adherence occurs among Canadians with chronic conditions.

Limitations

The small sample size of this study limited the ability to more precisely define the level (rather than a range) of out-of-pocket spending associated with cost-related prescription non-adherence. Additional research is needed to confirm these findings. As well, the data were self-reported, and therefore, are subject to recall and social desirability biases. For example, 11% of respondents did not know or could not estimate the amount they spent out-of-pocket on drugs and pharmaceutical products. Also, the results are based on out-of-pocket spending of individuals, and may underestimate total out-of-pocket spending of households. Finally, the generalizability of the results is limited to people with heart disease, stroke, diabetes, or hypertension.

Conclusion

Sub-optimal adherence to prescriptions for medications threatens both individual and societal health.[36] Canadians with cardiovascular-related conditions in the four western provinces whose out-of-pocket spending on drugs and pharmaceutical products was at least 5% of their household income were almost three times as likely to report cost-related prescription non-adherence as were those who spent less than 5%. While the results of this study point to an upper threshold, more data are required to determine if even lower levels of spending put individuals at risk of cost-related non-adherence.

These findings may be relevant for policy makers interested in measuring and tracking out-of-pocket spending on prescription medications as a health indicator, and underline the importance of collecting similar data to confirm the findings of the current study. ■

References

1. Mo F, Morrison H, Liepold H, Underhill L. Drug utilization in Canadian patients with major chronic diseases. *American Journal of Pharmacy Benefits* 2011; 3(3): e42-50.
2. Rotermann M, Sanmartin C, Hennessy D, Arthur M. Prescription medication use by Canadians aged 6 to 79. *Health Reports* 2014; 25(6): 3-9.
3. Daw JR, Morgan SG. Stitching the gaps in the Canadian public drug coverage patchwork?: A review of provincial pharmacare policy changes from 2000 to 2010. *Health Policy* 2012; 104(1): 19-26.
4. Demers V, Melo M, Jackevicius C. Comparison of provincial prescription drug plans and the impact on patients' annual drug expenditures. *Canadian Medical Association Journal* 2008; 178(4): 405-9.
5. Morgan S, Daw J, Law MR. *Rethinking Pharmacare in Canada*. Toronto: C.D. Howe Institute, 2013.
6. Campbell DJ, King-Shier K, Hemmelgarn BR, et al. Self-reported financial barriers to care among patients with cardiovascular-related chronic conditions. *Health Reports* 2014; 25(5): 3-12.
7. Canadian Institute for Health Information. *National Health Expenditure Trends, 1975 to 2013*. Ottawa: Canadian Institute for Health Information, 2013.
8. Luffman J. Out-of-pocket spending on prescription drugs. *Perspectives on Labour and Income* 2005; 17(4): 5-13.
9. Statistics Canada. Survey of household spending (SHS), household spending, Canada, regions and provinces. CANSIM Table 203-0021. Available at: http://www5.statcan.gc.ca/cansim/pick-choisir?lang=eng&p2=33&id=2030021
10. Statistics Canada. Survey of household spending (SHS), household spending, by age of reference person. CANSIM Table 203-0026. Available at: http://www5.statcan.gc.ca/cansim/pick-choisir?lang=eng&p2=33&id=2030026
11. Health Canada. *Healthy Canadians - A Federal Report on Comparable Health Indicators 2010*. Ottawa: Health Canada, 2010.

12. Law MR, Daw JR, Cheng L, Morgan SG. Growth in private payments for health care by Canadian households. *Health Policy* 2013; 110(2-3), 141-6.
13. Sanmartin C, Hennessy D, Liu Y, Law MR. Trends in out-of-pocket health care expenditures in Canada, by household income, 1997 to 2009. *Health Reports* 2014; 25(4): 13-7.
14. McLeod L, Bereza BG, Shim M, Grootendorst P. Financial burden of household out-of-pocket expenditures for prescription drugs: cross-sectional analysis based on national survey data. *Open Medicine* 2011; 5(1): e1-9.
15. Stanbrook MB, Hebert PC, Coutts J, et al. Can Canada get on with national pharmacare already? *Canadian Medical Association Journal* 2011; 183(18): E1275.
16. Law MR, Cheng L, Dhalla A, et al. The effect of cost on adherence to prescription medications in Canada. *Canadian Medical Association Journal* 2012; 184(3): 297-302.
17. Blanchard J, Madden JM, Ross-Degnan D, et al. The relationship between emergency department use and cost-related medication nonadherence among medicare beneficiaries. *Annals of Emergency Medicine* 2013; 62(5): 475-85.
18. Karaca-Mandic P, Jena AB, Joyce GF, Goldman DP. Out-of-pocket medication costs and use of medications and health care services among children with asthma. *Journal of the American Medical Association* 2012; 307(12): 1284-91.
19. Piette JD, Heisler M, Wagner TH. Cost-related medication underuse among chronically ill adults: the treatments people forgo, how often, and who is at risk. *American Journal of Public Health* 2004; 94(10): 1782-7.
20. Piette JD, Heisler M, Wagner TH. Problems paying out-of-pocket medication costs among older adults with diabetes. *Diabetes Care* 2004; 27(2): 384-91.
21. Piette JD, Wagner TH, Potter MB, Schillinger D. Health insurance status, cost-related medication underuse, and outcomes among diabetes patients in three systems of care. *Medical Care* 2004; 42(2), 102-9.
22. Tamblyn R, Laprise R, Hanley JA, et al. Adverse events associated with prescription drug cost-sharing among poor and elderly persons. *Journal of the American Medical Association* 2001; 285(4): 421-9.
23. Kennedy J, Morgan S. A cross-national study of prescription nonadherence due to cost: data from the Joint Canada-United States Survey of Health. *Clinical Therapeutics* 2006; 28(8): 1217-24.
24. Cunningham PJ. Despite the recession's effects on incomes and jobs, the share of people with high medical costs was mostly unchanged. *Health Affairs (Millwood)* 2012; 31(11): 2563-70.
25. Government of Canada. *The Health of Canadians—The Federal Role. Final Report, Volume 6, Recommendations for Reform to the Standing Senate Committee on Social Affairs, Science and Technology*. Ottawa: Government of Canada, 2002.
26. Statistics Canada. Household spending on prescription drugs as a percentage of after-tax income, Canada and provinces. CANSIM Table 109-5012. Available at: http://www5.statcan.gc.ca/cansim/pick-choisir?lang=eng&p2=33&id=1095012
27. Tang KL, Ghali WA, Manns BJ. Addressing cost-related barriers to prescription drug use in Canada. *Canadian Medical Association Journal* 2013; 186(4): 276-80.
28. Yeung C, Thomas S. *Income Imputation for the Canadian Community Health Survey*. Ottawa: Statistics Canada, 2012.
29. Statistics Canada. *Health Indicators: Indicators Based on Statistics Canada Surveys*. Ottawa: Statistics Canada, 2013.
30. Tamblyn R, Eguale T, Huang A, et al. The incidence and determinants of primary nonadherence with prescribed medication in primary care: a cohort study. *Annals of Internal Medicine* 2014; 160(7): 441-50.
31. Helin-Salmivaara A, Korhonen M J, Alanen T, Huupponen R. Impact of out-of-pocket expenses on discontinuation of statin therapy: a cohort study in Finland. *Journal of Clinical Pharmacy and Therapeutics* 2012; 37(1): 58-64.
32. Hanley GE, Morgan S, Reid RJ. Income-related inequity in initiation of evidence-based therapies among patients with acute myocardial infarction. *Journal of General Internal Medicine* 2011; 26(11): 1329-35.
33. Eaddy MT, Cook CL, O'Day K, et al. How patient cost-sharing trends affect adherence and outcomes: a literature review. *Physical Therapy* 2012; 37(1): 45-55.
34. Goldman DP, Joyce GF, Zheng Y. Prescription drug cost sharing: Associations with medication and medical utilization and spending and health. *Journal of the American Medical Association* 2007; 298(1): 61-9.
35. Doshi JA, Zhu J, Lee BY, et al. Impact of a prescription co-payment increase on lipid-lowering medication adherence in veterans. *Circulation* 2009; 119(3): 390-7.
36. World Health Organization. *Adherence to Long-term Therapies: Evidence for Action*. Geneva, Switzerland: World Health Organization, 2003.